UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,545	12/02/2004	Takeshi Ichikawa	03500.017320.	2864

5514 7590 02/05/2008

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
RAABE, CHRISTOPHER M	
ART UNIT	**PAPER NUMBER**
2879	
MAIL DATE	**DELIVERY MODE**
02/05/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,545	ICHIKAWA ET AL.	
	Examiner	Art Unit	
	CHRISTOPHER M. RAABE	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30 and 41-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31 and 41-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/2,7/29,7/24,1/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-31, 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lau et al. ("Field Emission from Metal-containing Amorphous Carbon Composite Films" Diamond and Related Materials Vol. 10, 1727-1731) in view of Tuck et al. (WO 99/28939).

With regard to claim 1,

Lau et al. disclose in at least sections 1,2: a layer (C); and a plurality of particles (Co,Al,Ti) each comprising as a main component a material which has resistivity lower than resistivity of a material of the layer (C), wherein the plurality of particles are arranged in the layer.

Lau et al. do not disclose the emitter device or the density of particles in the layer.

Tuck et al. do disclose in pages 7, 10, and figure 8 an analogous layer (19) formed on a cathode (18) of an emitter device wherein a density of the particles in the layer is $1x10^{14}/cm^3$ or more and $5x10^{18}/cm^3$ or less, providing a display device.

It would have been obvious to incorporate the particle density of Tuck et al. into the device of Lau et al. in order to provide a display device.

With regard to claim 12,

Lau et al. disclose an electron-emitting device according to claim 1, wherein surface unevenness of the layer is smaller than 1/10 of its film thickness in rms.

With regard to claim 13,

Lau et al. disclose an electron-emitting device according to claim 1, wherein the layer comprises carbon as a main component.

With regard to claim 16,

Lau et al. disclose an electron-emitting device according to claims 1, wherein the particles comprise metal as a main component.

With regard to claim 18,

Lau et al. disclose an electron-emitting device according to claim 1, wherein the particles comprise monocrystalline metal as a main component.

With regard to claim 19,

Lau et al. disclose additionally in section 3, an electron-emitting device according to claim 1, wherein the particles have an average particle diameter of 1 nm or more to 10 nm or less.

With regard to claim 20,

Lau et al. disclose an electron-emitting device according to claim 1, wherein the layer has a thickness of 100 nm or less.

With regard to claim 21,

Lau et al. disclose an electron-emitting device according to claim 1. Tuck et al. disclose additionally in figure 2b wherein at least two adjacent particles among the plurality of particles are arranged 5 nm or less apart from each other. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 23,

Lau et al. disclose an electron-emitting device according to claim 1. Tuck et al. disclose wherein a density of the particles in the layer is $1x10^{15}/cm^3$ or more and $5x10^{17}/cm^3$ or less. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 25,

Lau et al. disclose an electron-emitting device according to claim 1. While Lau et al. do not disclose wherein a concentration of a main element of the particles with respect to a main element of the layer is 0.05 atm % or more and 1 atm % or less, the optimization of

parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

With regard to claim 26,

Lau et al. disclose an electron-emitting device according to claim 1. Tuck et al. disclose in at least figure 2b wherein: the plurality of particles (231) are arranged dispersedly in the layer as a plurality of groups of particles, each group being constituted by at least two adjacent particles; one of the two adjacent particles are placed to be nearer to the cathode electrode than the other particle; and the plurality of groups of particles are arranged apart from each other by an average film thickness of the layer or more. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 27,

Lau et al. disclose an electron-emitting device according to claim 1, wherein the surface of the layer is terminated with hydrogen.

With regard to claim 28,

Lau et al. disclose an electron-emitting device according to claim 1. Tuck et al. disclose an insulating film (20) which is arranged on the cathode electrode and has a first opening; and a gate electrode (21) which is arranged on the insulating film and has a second opening, wherein: the first opening and the second opening communicate with each other; and the layer is exposed in the first opening. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 29,

Tuck et al. disclose an electron source, wherein a plurality of the electron-emitting devices according to claim 1 are arranged. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 30,

Tuck et al. disclose an image display apparatus, characterized by comprising the electron source according to claim 29 and a light-emitting member which emits light by being irradiated with electrons. The obviousness of combining the features of Tuck et al. with those of Lau et al. was addressed in the rejection of claim 1.

With regard to claim 2,

Lau et al. disclose in at least sections 1,2: a layer (C); and a plurality of particles (Co,Al,Ti) each comprising as a main component a material which has resistivity lower than resistivity of a material of the layer (C), wherein the plurality of particles are arranged in the layer. While Lau et al. do not disclose wherein a concentration of a main element of the particles with respect to a main element of the layer is 0.001 atm % or more and 1.5 atm % or less, the optimization of parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

Lau et al do not disclose the electron emitting device.

Tuck et al. do disclose in pages 7, 10, and figure 8 an analogous layer (19) formed on a cathode (18) of an emitter device, providing a display. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the features of Tuck et al. with those of Lau et al. in order to provide a display.

With regard to claim 3,

Lau et al. disclose in at least sections 1,2: a layer (C); and a plurality of particles (Co,Al,Ti) each comprising as a main component a material which has resistivity lower than resistivity of a material of the layer (C), wherein the plurality of particles are arranged in the layer. While Lau et al. do not disclose wherein a concentration of a main element of the particles with respect to a main element of the layer is 0.001 atm % or more and 1.5 atm % or less, the optimization of parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

Lau et al. do not disclose the emitting device or the density of particles.

Tuck et al. do disclose in pages 7, 10, and figure 8 an analogous layer (19) formed on a cathode (18) of an emitter device wherein a density of the particles in the layer is $1x10^{14}/cm^3$ or more and $5x10^{18}/cm^3$ or less, providing emission sites in a thin layer.

It would have been obvious to incorporate the particle density of Tuck et al. into the device of Lau et al. in order to provide emission sites in a thin layer.

With regard to claim 4,

Lau et al. disclose in at least sections 1,2: a layer comprising carbon (C) as a main component; and a plurality of particles (Co,Al,Ti) comprising metal selected from Co, Ni, and Fe as a main component, wherein the plurality of particles are arranged in the layer.

Lau et al. do not disclose the emitting device particle arrangement.

Tuck et al. do disclose in pages 7, 10, and figures 8, 2b an analogous layer (19) formed on a cathode (18) of an emitter device Tuck et al. disclose in at least figure 2b wherein the plurality of particles (231) are arranged wherein in at least two adjacent particles one of the two

adjacent particles are placed to be nearer to the cathode electrode than the other particle, providing a display device. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the features of Tuck et al. with those of Lau et al in order to provide a display device.

With regard to claim 14,

Lau et al. disclose an electron-emitting device according to claims 4. While Lau et al. do not disclose wherein an average concentration of hydrogen with respect to carbon in the layer is 0.1 atm % or more, the optimization of parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

With regard to claim 15,

Lau et al. disclose an electron-emitting device according to claim 4, wherein the layer comprising carbon as a main component has an sp^3 bonding.

With regard to claim 22,

Lau et al. disclose an electron-emitting device according to claim 4. While Lau et al. do not disclose the density of particles in the layer, Tuck et al. do disclose a density of the particles in the layer is $1x10^{14}/cm^3$ or more and $5x10^{18}/cm^3$ or less. The obviousness of the combination of the features of Lau et al. with those of Tuck et al. was addressed in the rejection of claim 4.

With regard to claim 24,

Lau et al. disclose an electron-emitting device according to claim 4. While Lau et al. do not disclose wherein a concentration of a main element of the particles with respect to a main element of the layer is 0.001 atm % or more and 1.5 atm % or less, the optimization of parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

With regard to claims 5-11, 17, 41--46,

Lau et al. disclose in at least sections 1,2 a layer containing carbon (C) as a main component wherein a plurality of groups of particles (Co, Al, Ti) which are constituted by at least two particles which comprise metal selected from Co, Ni, and Fe as a main component, and are arranged in the layer; each of the particles comprises as a main component a material which has resistivity lower than resistivity of a material of the layer, graphene being arranged between adjacent particles. While Lau et al. do not disclose the layer containing 1atm% or more and 20 atm% or less with respect to a carbon element, the optimization of parameters, absent evidence to the contrary, has been held to be obvious to one of ordinary skill in the art at the time of the invention.

Lau et al. do not disclose the arrangement of the particles or the emitting device.

Tuck et al. do disclose in pages 7, 10, and figures 8, 2b, 10a an analogous layer (19) formed on a cathode (18) of an emitter device having a light emitting member (68) wherein the adjacent two particles are arranged in a range of 5 nm or less; one of the adjacent two particles is arranged to be nearer to the cathode electrode (18) than the other particle; and the plurality of groups of particles (231) are arranged apart from each other by an average film thickness of the layer or more, providing a display device. It would have been obvious to one of ordinary

skill in the art at the time of the invention to combine the features of Lau et al. with those of Tuck et al. in order to provide a display device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER M. RAABE whose telephone number is (571)272-8434. The examiner can normally be reached on m-f 7am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CR

PETER MACCHIAROLO